IOBP AND PELLETIZATION

Requirement Of Pelletization.

We are aware that there are basically three types of feed (i) Lump ore, (ii) Sinter & (iii) Pellets.

Iron Ore Pellets are spherical balls of 9-16 mm dia size and 250 Kg/cm^2 Cold Crushing(compressive) Strength.

Iron ore quality depends on three factors:

- Chemical composition: The higher the level of iron and the lower the level of impurities, the better.
- Physical characteristics: Particle size.
- Metallurgical performance: Other factors that affect productivity in the steelmaking process

Availability of high grade ore reserve is on decline. Mine owners have to think of a process which will enable them to upgrade their low grade ore.

In case the ore contains low grade Fe and other impurities, the same has to undergo a **Beneficiation Process,** a metallurgical (Physical & Chemical) process in which waste materials (Gangue material) are separated from a low grade ore to produce an enriched high grade concentrate. A beneficiation process may involve, scrubbing, screening, size reduction, magnetic separation, gravity separation, thickening and dewatering. Due to the size reduction of the ore, it becomes essential to agglomerate the ore into a regular size with good strength. Compared to sintering Pelletization is the better way to feed the beneficiated ore to the DRI Kiln.

The Beneficiation process has to be designed specifically depending on the type and nature of the ore. Some standard lab tests and bench scale tests will help to design the flow chart and mass balance.

Pelletizing is basically, Proportionating →Mixing → Balling → Screening → Induration

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Induration can be in many ways

Two most popular Pelletization Techniques :-

i) **Straight Grate Technology** developed by Dravo-Lurgi, where the Single furnace performs, Up draught drying, Down draught drying, Firing stage -1, Firing stage-2, Cooling stage -1 & Cooling stage -2. This method is more popular for a bigger size Plant using Hematite ore as the feed.

ii) **TG- KILN -COOLER** Technology developed by Allis Chalmers , the above job is distributed among , Traveling Grate Furnace, Rotary Kiln & Annular Cooler. This method works more efficiently for Magnetite Ore , but also working well in India for Hematite Ore.

Fuel : In India coal has emerged as the main fuel for Pelletization, viz. Pulverized Coal Injection system & Producer Gas Plant. Producer gas Plants can handle coal of lower quality and remain cost effective.

Advantages of Pellets

Iron ore pellet is a kind of agglomerated fines which has better tumbling index when compared with the iron ore and it can be used as a substitute for the same both in the blast furnace and for DR production.

1. Pellets have good reducibility since they have high porosity (25-30%). Normally pellets are reduced considerably faster than sinter as well as iron ore lumps. High porosity also helps in better metallization in DRI production.
2. Pellets have a uniform size range generally within a range of 8 -16 mm.
3. Pellets have spherical shape and open pores which give them good bed permeability.
4. Pellets have low angle of repose which is a drawback for pellet since it creates uneven binder distribution.
5. The chemical analysis is uniform since it gets controlled during the beneficiation process. Fe content varying from 63% to 68% depending on the Fe content of Ore fines. Absence of LOI is another advantage of the pellets.
6. Pellets have high and uniform mechanical strength and can be transported to long distances without generation of fines. Further it has got resistance to disintegration. High mechanical and uniform strength of pellets is even under thermal stress in reducing atmosphere.